K 1369

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004.

Third Semester

Information Technology

IF 246 — DATA STRUCTURES AND ALGORITHMS

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are the character sets that are provided by the coding schemes ASCII and EBCDIC?

2. What are the primitive functions in a string handling system?

3. Assume that 4 bytes storage are required to hold each element of the following Pascal array.

   var values : array [1..8, 1..3] of integer;

   Assume further that storage for the array begins at byte 2000 in memory, give the actual address of element values [4, 2].

4. What is a priority queue?

5. Show that the total number of nodes in a complete binary tree of depth d is $2^{d+1} - 1$.

6. Write down the adjacency matrix of the following graph given in Fig. 6 :

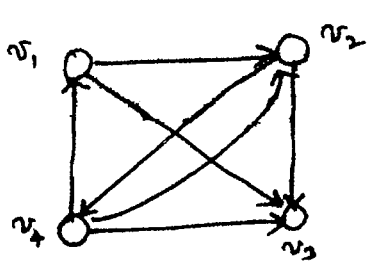

Fig. 6

7. How many key comparisons and interchanges are required to sort a file of size n using bubblesort?

8. What is the average number of comparisons done by sequential search in the successful case?

9. Write down the primary uses of external storage devices.

10. What are the various types of file structures exist for a VSAM file?

PART B — ($5 \times 16 = 80$ marks)

11. (i) Write an algorithm to concatenate two strings. (8)

(ii) Write grammars for the following languages :

(1) the set of non negative odd integers

(2) the set of non negative even integers with no leading zeros permitted. (8)

12. (a) (i) What are the different operations that can be applied on a stack? Write down the algorithms. (10)

(ii) How do you delete a node from a linked linear list? (6)

Or

(b) (i) Write down the algorithm to convert an infix expression to reverse polish expression. (8)

(ii) Write algorithms to insert and to delete a key in a circular queue. (8)

13. (a) Define traversal. What are the various traversals that are permitted for a binary tree? Write down their recursive algorithm and apply to the following example given in Fig. 13 (a).

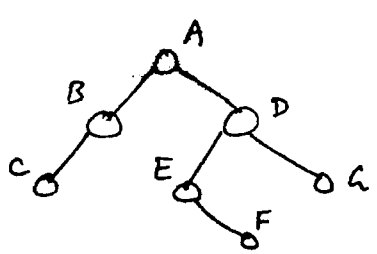

Fig. 13 (a)

Or

(b) Write down the algorithms for a depth first search and breadth first search and apply to the following example given in Fig.13 (b) :

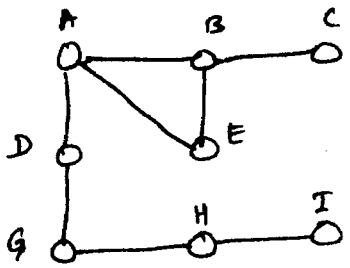

Fig. 13 (b)

14. (a) (i) Construct a heap for the initial key set given the list 42, 23, 74, 11, 65, 58, 94, 36, 99 and 87. (8)

(ii) Write down the binary search algorithm and obtain the complexities of both worst and average cases. (8)

Or

(b) (i) Write down the algorithm for radix sort. (8)

(ii) What are the various methods of defining hashing function? Explain any two methods. (8)

15. (a) What is an external storage device? Explain in detail about any two devices.

Or

(b) Write algorithm to insert a record and to retrieve a record from a direct file.